

## METHOD AND APPARATUS FOR UTILIZING DEMAND INFORMATION AT A VENDING MACHINE

5 The present application is a continuation-in-part of United States patent  
application serial no. 09/164,670, which is a continuation-in-part of co-pending  
United States patent application serial no. 09/012,163 entitled "METHOD AND  
APPARATUS FOR AUTOMATICALLY VENDING A COMBINATION OF  
PRODUCTS" filed on January 22, 1998, which is a continuation-in-part of co-  
pending United States patent application serial no. 08/947,798 entitled "METHOD  
10 AND APPARATUS FOR DYNAMICALLY MANAGING VENDING  
MACHINE INVENTORY PRICES" filed on October 9, 1997. The entirety of each  
of the above is incorporated herein by reference as part of the present disclosure.

### Field of the Invention

15 This invention relates generally to dispensing devices.

### Background of the Invention

Modern vending machines typically store and dispense a vast array of  
merchandise and/or offer various services in response to a customer request  
20 accompanied by appropriate payment. Examples of merchandise dispensed by  
such machines include drinks, candy, frozen deserts, snacks, video tapes and  
children's toys. Examples of services offered include automated car washes,  
portrait photographs, laundry machines, television viewing and blood pressure  
monitoring.

25 Many entrepreneurs are attracted to the basic concept of selling products  
and services using a vending machine. Vending machines are generally considered  
to have significant advantages over traditional merchandising. Specifically,  
vending machines enable the automated sale of merchandise and services at  
unconventional locations and times, and they do not require sales personnel.

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### **Brief Description of the Drawings**

FIG. 1. is a schematic block diagram of a dispensing device in accordance with an embodiment of the present invention.

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FIG. 2 is a block diagram illustrating an operator authorization database used by the dispensing device of FIG. 1.

FIG. 3 is a block diagram illustrating a transaction database used by the dispensing device of FIG. 1.

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FIG. 4 is a block diagram illustrating a suggestive sell database used by the dispensing device of FIG. 1.

FIG. 5 is a block diagram illustrating an inventory database used by the dispensing device of FIG. 1.

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FIG. 6 is a block diagram illustrating a demand database used by the dispensing device of FIG. 1.

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FIG. 7 is a flow chart illustrating an embodiment of a process by which an operator can access demand data stored by the dispensing device of FIG. 1.

FIGS 8A-8C are flow charts illustrating demand monitoring and suggestive sale functions that may be performed by the dispensing device of FIG. 1 in certain embodiments of the present invention.

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### **Detailed Description of the Preferred Embodiments**

Various embodiments of the present invention are advantageous. For example, certain embodiments deal favorably with perishable inventory. Certain embodiments promote the sale of low demand products. Certain embodiments

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promote the sale of products having quality which are inferior and / or which are perceived to be inferior.

Definitions:

5           The following terms as used herein will be understood to have the following meanings unless otherwise indicated:

Dispensing device:           Any device or machine capable of receiving, directly or indirectly, an amount of money or other payment, and providing, directly or  
10   indirectly, one or more products.

Product:                   Anything, including a good and / or service, that may be sold or provided using a dispensing device.

15   Substitute product:           A product offered in place of another product.

Predetermined product:       A product which is set as a default substitute product.

20   Product identifier:           A designation that corresponds to or otherwise identifies a product.

Expiration date:           A date on which a product is no longer (i) suitable for sale, use or consumption, or (ii) desired to be sold, used or consumed.

25   Availability:               Whether a product is (i) able to be dispensed, or (ii) should be dispensed.

Amount of money:           A monetary value, such as cash, credit, or electronic  
30   cash transferred to or otherwise provided to a dispensing device.

Discounted price: A price of a product which is less than the typical price of the product.

Purchaser: An entity that purchases, attempts to purchase or  
5 wishes to purchase a product.

Selection: An indication of one or more products that the purchaser (i) desires to purchase, or (ii) attempts to purchase.

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Embodiments of the present invention will now be discussed with reference to Figures 1-8C. Fig. 1 displays a schematic block diagram of dispensing device **100** and its components. Dispensing device **100** may be a vending machine, kiosk or any other mechanism by which a purchaser may purchase products. Dispensing  
15 device **100** is controlled by central processing unit (CPU) **101** which may comprise one or more commonly manufactured microcontrollers or microprocessors, such as the Pentium 4® manufactured by Intel® Corporation. Central processing unit (CPU) **101** runs at a clock speed determined by clock **123**, which is operatively connected to CPU **101**.

20 Central processing unit (CPU) **101** may further be operatively connected to one or more standard computer-based components such as random access memory (RAM) **121**, read-only memory (ROM) **119**, input device(s) **133**, output device(s) **135** and data storage device **103**. Random access memory (RAM) **121** may be, for example, one or more single inline memory module (SIMM) chips capable of  
25 storing a predetermined amount of data (typically measured in megabytes) and used by central processing unit (CPU) **101** for temporary storage of processing instructions and data during operation of dispensing device **100**. Read-only memory (ROM) **119** may comprise at least one permanent non-erasable and non-rewritable memory that stores, e.g., initializing instructions to be used by central  
30 processing unit (CPU) **101** during, e.g., a start-up routine performed by dispensing device **100**. Further functions of random access memory (RAM) **121** and read-only memory (ROM) **119** will be apparent to one of ordinary skill in the art.

For example, one or more of CPU **101**, input device(s) **133**, RAM **121**, ROM **119**, output device(s) **135** and data storage device **103** may be included, wholly or partially, in a separate device, such as the e-Port™ by USA Technologies Inc., that is in communication with a vending machine (e.g., a vending machine manufactured by Crane Co. or Stentorfield Ltd, an ATM, a kiosk.). The separate device may also be in communication with a network such as the Internet.

The e-Port™ is a credit and smart card-accepting unit that controls access to office and MDB vending equipment, and serves as a point of purchase credit card transaction device. The e-Port™ includes an LCD that allows for the display of color graphics, a touch sensitive input device (touch screen) that allows users to input data to the device. The display may be used to prompt users interactively with, e.g., advertising messages (which may be derived dynamically via a network), an ordering sequence or other instructions, and information about their transaction status. Such information and content can be drawn by the e-Port™ through the Internet or submitted directly to the e-Port™. User response information may be retrieved from the e-Port™ through the Internet or directly, and thereby collected by, e.g., a server in communication with the e-Port™ via a network.

The separate device may alternatively be a programmed computer running appropriate software for performing the necessary functions described herein.

The separate device may be operable to receive input from purchasers, receive payment from purchasers, exchange information with a remotely located server and / or display messages to purchasers. The separate device may be operable to instruct the vending machine that appropriate payment has been received (e.g., via a credit card read by the separate device) and / or that a particular product should be dispensed by the vending machine.

Input device(s) **133** may comprise one or more of the following commonly known peripherals used for inputting data to a dispensing device: a parallel port, a serial port, any port for interfacing with a computing device such as a PDA, cell phone or MP3 player, a keypad, a push button, a microphone, a disk drive such as a floppy disk, DVD or CD drive, and a voice recognition device. Input device(s)

133 may include either or both of (i) an external input device for use by a purchaser and (ii) an internal input device that is accessible by a servicer or operator of dispensing device 100, e.g., after the device has been opened. In this manner, a purchaser may, e.g., enter his or her selections for products through an external input device, and a servicer may, e.g., access and update data stored by  
5 dispensing device 100 through the internal input device.

Output device(s) 135 may comprise one or more of the following commonly-known peripherals used for outputting data directly or indirectly from a microprocessor: a parallel port, a serial port, any port for interfacing with a  
10 computing device such as a PDA, cell phone or MP3 player, a printer, a monitor, an LED display, an LCD display, a speaker or other audio output, a voice synthesizer, a disk drive with write capability such as a floppy disk, DVD or CD drive, .

Output device(s) 135 may include either or both of (i) an external output  
15 device for use by a purchaser and (ii) an internal output device that is accessible by a servicer or operator of dispensing device 100, e.g., after the device has been opened. In this manner, a servicer may receive data stored by dispensing device 100 through the internal output device. Further applicable output devices will be apparent to one of ordinary skill in the art. Additionally, input device(s) 133 and  
20 output device(s) 135 may comprise one device, such as a communications port that can both receive and transmit data.

CPU 101 is operatively connected to transmit and receive data from data storage device 103, which may comprise any appropriate combination of semiconductor, magnetic and / or optical media for storing data persistently or  
25 transiently. For example, any one of the following commonly known peripherals may be used for storing computer data: a hard drive, a floppy disk drive, a DVD drive of the type manufactured by Philips Electronics, a ZIP drive of the type manufactured by IOMEGA, a tape drive and a Digital Audio Tape drive. Further such devices will be apparent to one of ordinary skill in the art. Data storage  
30 device 103 is operative to store operator authorization database 105, suggestive sell database 107, inventory database 109, demand database 111, and transaction

database 113, each of which is discussed below with reference to FIGS. 2-6, respectively.

5 Data storage device 103 may further be operative to store an operating system (not shown) and one or more application programs 115. In accordance with a preferred embodiment of the present invention, the application program(s) 115 contain processing instructions for central processing unit (CPU) 101 to retrieve and perform the operator verification process shown in FIG. 7, and the demand monitoring and suggestive sell functions of FIGS. 8A-8C, each of which is discussed in detail below.

10 Central processing unit (CPU) 101 is further operatively connected to timer 117 which can be set, reset and read by central processing unit (CPU) 101 to measure the passage of time. Alternatively, central processing unit (CPU) 101 may use signals generated by clock 123 to measure the passage of time in place of timer 117, as will be apparent to one of ordinary skill in the art.

15 Central processing unit (CPU) 101 is further operatively connected to monitor and operate currency storage 125, coin acceptor 127, card reader 128, bill validator 129, change dispenser 131, item dispenser(s) 137, and detector 139. Currency storage 125 is equipped to store both physical currency and electronic forms of currency, such as e-cash or credits from a debit card, credit card or smart  
20 card, received by dispensing device 100. Coin acceptor 127 accepts and determines an amount of money received from coinage deposited into dispensing device 100. Card reader 128 receives electronic currency from a card, such as a smart card, debit card or credit card and/or determines account information for an account owned by the card owner. The account information is stored and used to  
25 apply a charge against the account for a product selected and dispensed by dispensing device 100. Bill validator 129 accepts and determines an amount of money received from monetary bills deposited into dispensing device 100.

30 Change dispenser 131 dispenses any change that is due to a purchaser who deposits money into coin acceptor 127, card reader 128, or bill validator 129. The amount of change to be dispensed is determined by central processing unit (CPU) 101 by using one of the application program(s) 105. In a process not shown, but apparent to one of ordinary skill in the art, central processing unit (CPU) 101

determines an amount of money that a purchaser has deposited, recognizes a product that the purchaser has selected and calculates the difference between the amount of money deposited and the amount to be charged for the product. The difference is dispensed to the purchaser through change dispenser 131. Change dispenser 131 may be operatively connected to currency storage 125 (not shown) to dispense change from that device.

Detector 139 is a device that sends a signal to central processing unit (CPU) 101 when a purchaser is detected near dispensing device 100. Detector 139 is used by dispensing device 100 to initiate the demand monitoring and suggestive sell functions discussed further below with regard to FIGS. 8A-8C. Detector 139 may be any of the following types of devices: a motion detector, an infrared detector, an acoustic signal detector, a pressure detector mounted on the floor in front of dispensing device 100 or any other device that may detect a presence of a purchaser when he or she is in proximity of dispensing device 100 and which outputs a signal indicative of the presence of the purchaser.

Referring now to FIG. 2, operator authorization database 105 stores operator identifiers and corresponding authorization codes which are required to be entered in order to access data stored in dispensing device 100. Each record in operator authorization database 105 contains an entry in operator identifier field 201 and authorization code field 203. Operator identifier field 201 preferably lists several codes, each of which are assigned to a particular operator or servicer authorized to access data stored by dispensing device 100. Each such code in operator identifier field 201 has a corresponding unique authorization code stored in authorization code field 203. Upon accessing dispensing device 100, an operator must enter, through input device(s) 133, a valid operator identifier code and the authorization code assigned to that identifier. Upon entry of the information, central processing unit (CPU) 101 refers to operator authorization database 105 and confirms that the entered information matches a record in operator authorization database 105. As discussed further with regard to FIG. 7, if the information matches, the operator is allowed to access and update data stored in data storage device 103 of dispensing device 100. If the information does not match, the operator is denied access to the machine.



FIG. 3 displays the exemplary contents of suggestive sell database 107 which is maintained by dispensing device 100 for implementing the suggestive sale functions performed, as described further with regard to FIGS. 8A-8C. A suggestive sell is an offer to sell a product. Such offers are typically made by the dispensing device, but may be made by other devices with or without the direction of the dispensing device. In several embodiments of the present invention, the suggestive sell is offered when (i) no product has yet been selected by a purchaser, (ii) a product selected by a purchaser is unavailable, and / or (iii) a product selected by a purchaser is not desirable (for various reasons) to sell to the purchaser. For example, it may be desirable to reserve a selected product for a future purchaser rather than sell it to the instant purchaser. This can occur, e.g., when the product is likely to sell later and / or when the product is the subject of a subscription or other agreement to purchase.

Each record of suggestive sell database 107 contains an entry in product identifier field 301, suggestive sell file location field 303, suggestive sell content field 305, suggestive sell price field 307, suggestive sell criterion field 309, substitute product identifier field 311, suggestive sells offered field 312 and suggestive sells accepted field 314.

In certain embodiments, each entry in product identifier field 301 corresponds to one product offered by dispensing device 100. A unique product identifier is assigned to each type of product or, alternatively may correspond to a rack or shelf (not shown) in dispensing device 100 on which the product is stored and/or displayed and / or from which the product is dispensed. For each product identifier, an entry of a suggestive sell file is made in suggestive sell file location field 303. The suggestive sell file location is preferably an address of a data file stored in storage device 103. The data file may contain audio or textual information that is output to a purchaser during the suggestive sell functions described further in conjunction with FIGS. 8A-8C. The audio and textual information is preferably a description of a suggestive sell being offered to a purchaser during a transaction.

For each product identifier, an entry is also made in suggestive sell content field 305. The suggestive sell content lists the text or audio message stored at the

location stored in suggestive sell file location field **303**. The information in this field preferably corresponds to the audio or textual information that is to be presented to a purchaser during the suggestive sell functions performed by dispensing device **100**, discussed further in conjunction with FIGS. 8A-8C.

5           For each product identifier, an entry is also made in suggestive sell price field **307**. The suggestive sell price is a discounted price, preferably determined by an operator of dispensing device **100**, for which a product will be offered during the suggestive sell function discussed further in conjunction with FIGS. 8A-8C.

10           For each product identifier, an entry is also made in suggestive sell criterion field **309**. The suggestive sell criterion is preferably defined and entered by an operator of dispensing device **100**. The suggestive sell criterion may be a requirement that the average demand for a product associated with the criterion is below a certain average demand rate. Additional and/or alternate suggestive sell criteria may be included as will be apparent to one of ordinary skill in the art. In  
15           any event, if the suggestive sell criterion is met, the product associated with the criterion is eligible to be offered in the suggestive sell function described in conjunction with FIGS. 8A-8C.

20           For each product identifier entered in product identifier field **301**, a substitute product identifier is entered in substitute product identifier field **311**. The substitute product identifier is meant to identify a product to be offered when an initial product selection is not available. For example, referring to record **320** of FIG. 3, if product A1 is selected by a purchaser and is not available, then the machine will offer product B3 as a suggestive sell.

25           The substitute product to be offered may be operator-selected or may be determined by the dispensing device **100** after an analysis of demand data has been performed. In various embodiments of the present invention, demand for a product may be based on the number of times the product was selected for purchase. In other embodiments, demand may be measured in different ways and based on different information. For example, demand for a product may be based on  
30           information regarding subscriptions for the product. Subscriptions at dispensing devices is described in U.S. Patent Nos. 5,988,346 and 6,298,972, each of which are incorporated herein by reference as part of the present disclosure. As an

example, subscriptions to a first product may imply that a certain number (e.g., seventy units) of the first product will be (or probably will be) dispensed from a first dispensing device(s) during a predetermined interval (e.g., the current month). Accordingly, this expected number of the first product may be used to derive the demand for the first product.

For example, CPU 101 may be programmed to track and store which product is most often selected after an initially selected product is identified as being unavailable. In one embodiment, a product identifier corresponding to the most often alternately-selected product may then be stored as a substitute product in substitute product identifier field 311. Other criteria may be employed in programming the device to determine a substitute product. These criteria may include: which product has been stocked most recently (as may be determined by examining stock date field 409); which product is due to be restocked at the earliest date (as may be determined from restock date field 411); or which product will expire at the earliest date (as may be determined from product expiration date field 413). Other criteria may be employed in making the determination as to which product will act as a substitute product, as will be apparent to one of ordinary skill in the art.

Preferably, a substitute product identifier is listed for each product identifier in product identifier field 301. The substitute product identifier, furthermore, preferably corresponds to an existing product which is already listed in product identifier field 301. Hence, any product in substitute product field is preferably listed in product identifier field 301. However, for each record in suggestive sell database 107 the value listed in product identifier field 301 should not be the same product identifier listed in substitute product identifier field 311.

Suggestive sells offered field 312 of suggestive sell database 107 lists the number of times a product corresponding to the product identifier was offered in a suggestive sell. Suggestive sells accepted field 314 lists the number of times the product was accepted as a suggestive sell. This information is measured and recorded during the suggestive sell functions described in accordance with FIG. 8B. The information in these fields is useful to an operator of dispensing device 100, or to the dispensing device itself, to determine the effectiveness of a

5 suggestive sell for each of the products. For example, in the case where a product is offered through a suggestive sell many times, but is rarely accepted, the operator or dispensing device **100** may adjust the terms of the suggestive sell offered so that the acceptance rate increases. This may be accomplished, for example, by  
10 decreasing the suggestive sell price for the product, or by determining a suitable substitute product and changing the substitute product identifier of field **311**. Methods for allowing a dispensing device **100** to determine suitable substitute products and/or adjust suggestive sell prices are discussed further in co-pending United States patent application serial number 08/947,798 entitled "METHOD  
15 AND APPARATUS FOR DYNAMICALLY MANAGING VENDING MACHINE INVENTORY PRICES" filed on October 9, 1997 in the name of Daniel E. Tedesco, James A. Jorasch and Robert R. Lech and co-pending United States patent application serial no. 09/012,163 entitled "METHOD AND APPARATUS FOR AUTOMATICALLY VENDING A COMBINATION OF  
20 PRODUCTS" filed on January 22, 1998 in the name of Daniel E. Tedesco, James A. Jorasch, Jay S. Walker and Robert R. Lech, both incorporated herein by reference.

FIG. 4 displays the preferred contents of inventory database **109**. For each record in inventory database **109**, an entry is stored in product identifier field **401**,  
25 original inventory field **403**, current inventory field **405**, price field **407**, stock date field **409**, restock date field **411** and product expiration date field **413**.

Preferably, each entry in product identifier field **401** corresponds to one product offered by dispensing device **100**. Furthermore, the entries in product identifier field **401** may correspond to the entries made in product identifier field  
30 **301** of suggestive sell database **107**. Each identifier listed in product identifier field **401** is preferably a unique identifier that corresponds to a single product offered by the machine. As described above, the product identifier may correspond to a rack or shelf (not shown) in dispensing device **100** on which the product is stored and/or displayed.

For each product identifier in product identifier field **401**, an entry is made in original inventory field **403** that represents the number of the product originally placed for dispensing in dispensing device **100**. Current inventory field **405**

contains an entry, preferably maintained by dispensing device **100**, corresponding to the amount of the product remaining in dispensing device **100**. Price field **407** contains an entry, for each product, representing the original, non-discounted price at which the product is offered for purchase. Stock date field **409** lists, for each product, the date on which the product was placed in the dispensing device **100**. Restock date field **411** lists, for each product, a date on which the product is expected to be re-stocked by an operator of dispensing device **100**. Finally, product expiration date field **413** lists, for each product, a date on which the product is no longer suitable for use or consumption.

FIG. 5 displays demand database **111** which contains database records having a product identifier field **501**, average time for receipt of credits field **502**, average selection time field **503** and current average demand rate field **505**. Preferably, each entry product identifier field **501** corresponds to one product offered by dispensing device **100**. Furthermore, the entries in product identifier field **501** may correspond to the entries made in product identifier field **301** of suggestive sell database **107**. Each product identifier listed in product identifier field **501** is preferably a unique identifier that corresponds to a single type of product offered by the machine. Alternately, as described above, the product identifier may correspond to a rack or shelf (not shown) in dispensing device **100** on which the type of product is stored and/or displayed.

Average time for receipt of credits field **502** lists, for each product, an average amount of time taken by purchasers to input an amount of credits after detection of the customer by detector **139** of dispensing device **100**. This information is used by dispensing device **100** to determine a time after which to offer a suggestive sell, as discussed further in regard to FIGS. 8A-8C.

Average selection time field **503** lists, for each product, an average amount of time taken by purchasers to select the corresponding product. The average selection time may be determined differently in various embodiments of the present invention. For example, the average selection time may be based on a starting time such as the initial detection of a purchaser or an input of (partial or full) payment by the purchaser. The average selection time may alternatively or additionally be based on an ending time such as an input of (partial or full)

payment by the purchaser or receipt of a selection (e.g., from a purchaser). The average selection time may be determined by the dispensing device **100**, or by another means. In various embodiments, the average selection time may be used by dispensing device **100** to determine a time after which to offer a suggestive sell,  
5 as discussed further in regard to FIGS. 8A-8C.

Current average demand rate field **505** lists, for each product, a current rate of demand for the corresponding product. The demand rate for a product is preferably determined by measuring the number of times the product was selected over an amount of time, i.e. 12 selections of the product every 24 hours. This  
10 information is used by dispensing device **100** to determine a time after which to offer a suggestive sell, as discussed further in regard to FIGS. 8A-8C.

FIG. 6 displays the contents of transaction database **113** which contains database records having a product identifier field **601**, a product selection field **603** and an average sale price field **605**. Preferably, each entry in product identifier  
15 field **601** corresponds to one type of product offered by dispensing device **100**. Furthermore, the entries in product identifier field **601** may correspond to the entries made in product identifier field **301** of suggestive sell database **107**. Each identifier listed in product identifier field **601** is preferably a unique identifier that corresponds to a single type of product offered by the machine. As described  
20 above, the product identifier may correspond to a rack or shelf (not shown) in dispensing device **100** on which the product is stored and/or displayed.

Product selection field **603** lists, for each product, a number of times the product was selected by a purchaser. Average sale price field **605** lists, for each product, the average sale price for which a corresponding product was sold. The  
25 average sale price is determined, preferably, by counting the number of times a product was sold and at what price (either the original price or suggestive sell price) the product was sold in each instance. The average sale price may then be determined by calculating the sum of the sale prices and dividing by the number of product sales. Other methods will be apparent to one of ordinary skill in the art.  
30 The average sale price field contains data which may be useful to the operator of dispensing device **100** in determining the profitability of each product sold. The information in average sale price field **605** is updated during the demand

monitoring and suggestive sell functions described in conjunction with FIGS. 8A-8C below.

Turning now to FIG. 7, a process by which an operator can access and update data stored by the dispensing device **100** is displayed. This process is preferably performed by central processing unit (CPU) **101** in conjunction with at least one of the application program(s) **115**.

To perform the accessing process, an operator preferably gains access to the internal components of dispensing device **100**. The operator, through input device(s) **133** inputs commands to CPU **101** that initiates the accessing process. At step **701**, the operator inputs an operator code via input device(s) **133**. The operator code is read by CPU **101**. At step **703**, the CPU **101** prompts the operator, through output device(s) **135**, to enter the corresponding authorization code. At step **705**, after the operator has input the authorization code, CPU **101** accesses operator authorization database **105** and confirms that the operator identifier code and authorization code are valid. If the codes are both valid, the process continues on to step **709**, discussed below. If the codes are not valid, the process proceeds to step **707** where the operator is prompted to re-enter the correct codes. Steps **701**, **703**, **705**, and **707** may be repeated any number of times until the correct codes are entered, or may be terminated after a predetermined number of times.

After an entry of a correct operator code and a correct corresponding authorization code, the process continues to step **709** where the operator is allowed to transmit data through input device(s) **133** and receive data through output device(s) **135** from storage device **103**. At step **711**, CPU **101** receives any updated inventory data and corresponding suggestive sell data. CPU **101** stores the received inventory data in inventory database **109** and stores any received suggestive sell data in suggestive sell database **107**. For example, any received suggestive sell criterion data will be stored in suggestive sell criterion field **309** and any received suggestive sell content data will be stored in suggestive sell content field **305**. The received data is stored in the appropriate database fields as will be apparent to one of ordinary skilled in the art. After step **711**, the accessing process ends.

Turning now to FIG. 8A, the process by which CPU **101** performs demand monitoring and suggestive sale functions begins at step **801** where detector **139** sends a signal to CPU **101** indicating that a purchaser is present in front of dispensing device **100**. At step **803**, CPU **101** measures the time beginning from the detection of the customer. This may be accomplished by sending a start signal to timer **117** or by measuring the time using clock **123** as discussed previously with regard to FIG. 1. At step **805**, CPU **101** measures the amount of time passed since the purchaser was detected and compares it to an average time stored, for example, in average time for receipt of credits field **502**. If the measured time reaches the average time stored in field **502**, the process continues at step **815**. Otherwise the process continues at step **807**.

At step **807**, dispensing device **100** receives a number of credits from the purchaser. At step **808**, CPU **101** stops measuring the time passed since detection, determines a new average time for receipt of credits from a purchaser using the latest measured time and stores the value in field **502**. At step **809**, CPU **101** preferably starts a new measurement of time starting from the receipt of credits from the purchaser. This may be accomplished by sending a start signal to timer **117** or by measuring the time using clock **123** as discussed previously with regard to FIG. 1. At step **810**, CPU **101** measures the amount of time passed since the purchaser has input credits and compares it to the average times stored in average selection time field **503**. The time passed since the purchaser has input credits may be measured from the time a first credit (such as a coin) has been deposited in either coin dispenser **127**, card reader **128** or bill validator **129**.

Since, in the preferred embodiment, different average selection times are stored for each product, CPU **101** determines a threshold time by comparing the measured time to one of: the lowest average selection time stored in average selection time field **503**, the highest average selection time stored in average selection time field **503** or an average of the average selection times stored in average selection time field **503**. If the measured time reaches the threshold time, the process continues at step **815**, discussed further below. Otherwise the process continues at step **811**.



At step **811**, a selection of a product is made by the purchaser. At step **812**, CPU **101** stops measuring the time passed since the purchaser input credits, determines a new average time selection time for the product selected by the purchaser based on the latest measured time and stores the value in field **502** for the record corresponding to the selected product. At step **813**, CPU **101** updates the new current average demand rate in field **505** and increments the product selection field **603** of transaction database **113** for the product identifier corresponding to the selected product. The process then continues on to step **839**, discussed further below in conjunction with FIG. 8C below.

If previously at step **805** the threshold time has been reached, the process continues at step **815** where CPU **101** accesses inventory database **109**. At step **817**, CPU **101** searches current inventory field **405** of inventory database **109** for all product identifiers having a current inventory greater than or equal to one. At step **819**, CPU **101** then accesses demand database **111**. At step **821**, CPU **101** determines, from current average demand field **505** of demand database **111**, the current average demand rate for each product identifier having a current inventory greater than or equal to one. The process then continues at step **823**.

Referring now to FIG. 8B, at step **823**, CPU **101** next accesses suggestive sell database **107**. At step **825**, CPU **101** determines, for the product identifier or identifiers having a current inventory greater than one, which product demand data meets the criteria listed in suggestive sell criterion field **309** of database **107**. CPU **101** then determines which of these product identifiers have not already been selected by or suggested to the purchaser during the present transaction. This may be accomplished, for example, by tracking which products have been offered during the present transaction, and storing the tracking information temporarily in either data storage device **103** or random access memory **121**.

CPU **101** next determines which of the remaining product identifier(s) to offer to the purchaser as a suggestive sell. In the case where more than one product identifier remains after all the above criteria have been applied, CPU **101** may analyze further criteria to determine which product to offer as a suggestive sell. For example, CPU **101** may be programmed to determine which of the remaining products has the highest overall demand rate (as can be readily

determined by comparing the values in current average demand rate field **505**) and use that product in the subsequent steps relating to a suggestive sell. Alternatively, CPU **101** may be programmed to select the remaining product with the lowest overall demand rate in an effort to sell products with weak demand. Furthermore, CPU **101** may simply select a substitute product listed in substitute product identifier field **311**, if a purchaser has already selected a product which is out of stock or otherwise unavailable. Further criteria include which product has been stocked most recently (as may be determined by comparing the values stored in stock date field **409**), which product is due to be restocked earlier (as may be determined from restock date field **411**) or which product will expire earlier (as may be determined from product expiration date field **413**). Other criteria may be employed in making the determination as to which product to offer in a suggestive sell, as will be apparent to one of ordinary skill in the art.

After a product identifier has been determined in step **825**, the process continues at step **827** where CPU **101** determines the suggestive sell file location corresponding to that product identifier by accessing suggestive sell file location field **303**. The information in the file is then displayed or broadcast to the purchaser, as discussed above with regard to FIG. 3. Also as discussed, the information may correspond to the data listed in suggestive sell content field **305**. Furthermore, the product to be offered through a suggestive sell may be offered at the suggestive sell price listed in suggestive sell price field **307**.

At step **831**, CPU **101** determines whether the purchaser accepts the suggestive sell. This may be determined by ascertaining whether the purchaser has input the selection corresponding to the product identifier offered in the suggestive sell. If the suggestive sell is accepted, the process continues to step **835**, discussed below. Otherwise, the process continues to step **833**.

At step **833**, CPU **101** increments the record in suggestive sell offered field **312** corresponding to the product identifier offered during the suggestive sell. At step **834**, CPU **101** determines whether the purchaser inputs an alternate selection. If so, the process continues to step **839**, discussed below in conjunction with FIG. 8C. If not, the process returns to step **825**, discussed above, and can be repeated

any number of times until there are no further products which have not been offered to the purchaser.

At step **835**, after the purchaser accepts the product that is offered through the suggestive sell, CPU **101** completes the transaction by, for example, dispensing the product to the customer and dispensing any change due through change dispenser **131**. At step **837**, CPU **101** updates all records corresponding to the product identifier that are affected by the transaction. The updates preferably include: incrementing suggestive sell offered field **312**, incrementing suggestive sell accepted field **314**, decrementing current inventory field **405**, updating current average demand rate field **505**, incrementing product selection field **603** and updating average price field **605** by recalculating the average price by including the price for which the product was sold according to the suggestive sell. After step **837**, the demand monitoring and suggestive sell functions end.

Referring now to FIG. 8C, from either step **813** or step **834**, the process continues at step **839** where CPU **101** accesses inventory database **109**. At step **841**, CPU **101** determines the current inventory for a selected product by retrieving the appropriate value stored in current inventory field **405**. CPU **101** then determines whether the current inventory for the product selected by the purchaser is at least one, thereby determining whether any of the selected product remains in dispensing device **100**. If the current inventory of the selected product is zero, the process returns to step **815**. Otherwise the process continues on to step **843** wherein the transaction is completed. This is accomplished, for example, when dispensing device **100** dispenses the selected product to the customer and dispenses any change due through change dispenser **131**.

Next, at step **845**, the average sale price for the product identifier corresponding to the selected product is updated according to the sales data from the current transaction. The new average sale price is determined and stored in average sale price field **605**, after which the process ends.

While the best mode contemplated for carrying out the invention has been described in detail in the foregoing, those of ordinary skill in the art to which the instant invention relates will recognize various alternative designs and embodiments for practicing the invention. For example, various components, steps

and limitations described herein may be included in some, but not required in all, embodiments of the invention. Various steps may be performed by entities / components different than those of the various embodiments described herein.

The processes described herein may be performed wholly or partially  
5 manually. The processes described herein may be performed wholly or partially by a computing device. With respect to the processes described herein, a device readable medium may be encoded with processing instructions for directing a processor or other device to perform the process. Similarly, an apparatus including a processor and appropriate instructions may perform the processes described  
10 herein.

The database structures described above and in the figures may be rearranged, fields may be added or deleted, the databases may be consolidated, or the database(s) otherwise altered. Furthermore, though a stand-alone dispensing device has been described in various embodiments, it is contemplated that the  
15 dispensing machine may be a networked device with the ability to store data either locally or at an alternate, networked location. Further, the dispensing device may comprise one or more devices, such as separate devices for receiving payments and for providing products. Such alternative embodiments are contemplated to be within the scope of the instant invention. Accordingly, it is to be understood that  
20 the foregoing description is provided for illustrative purposes only and does not limit the scope of the instant invention, as defined by the appended claims.